

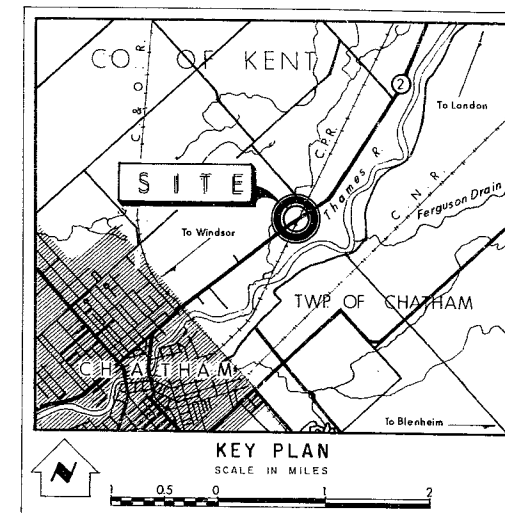
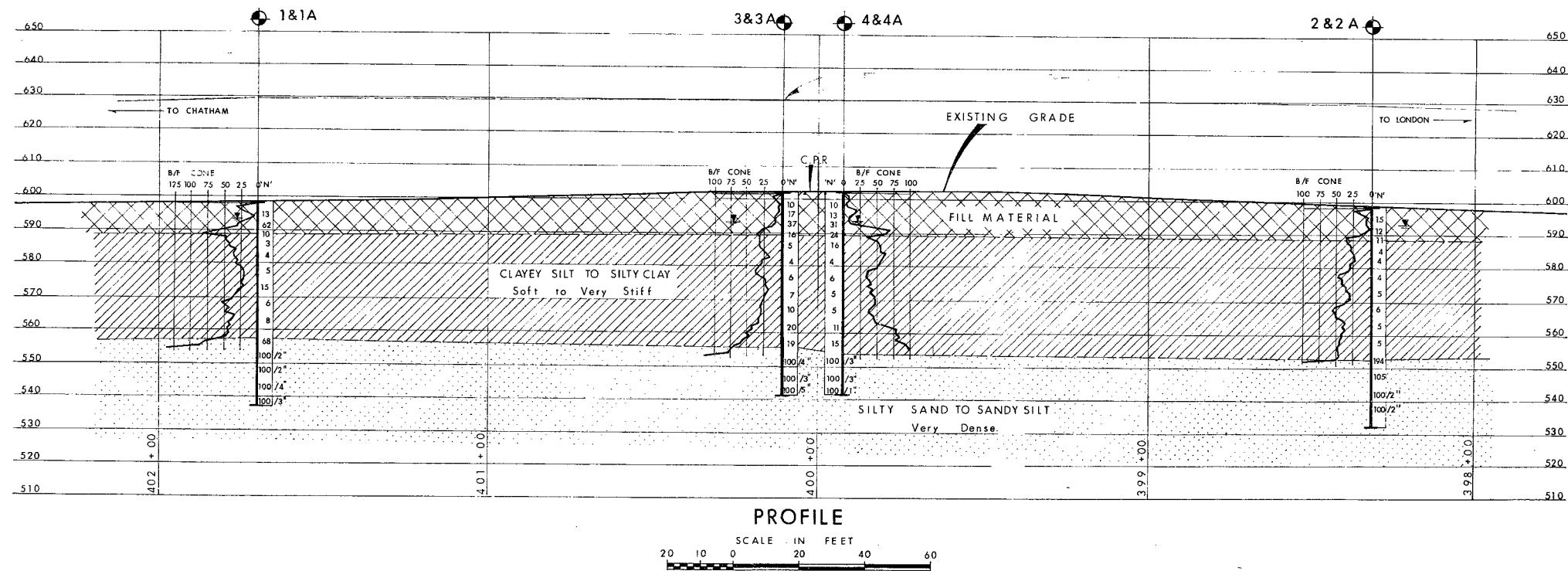
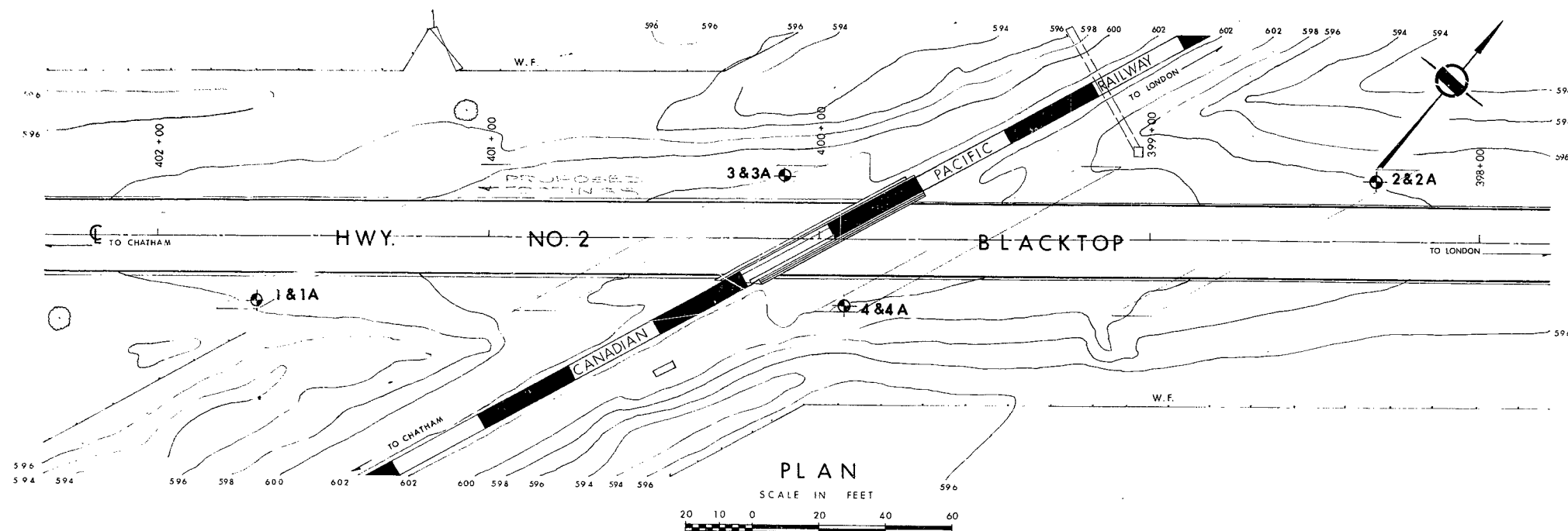
66-F-52

W.P. # 12-63

HWY. #2

C.P.R. OVERHEAD

CHATHAM TWP.



LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation, MAY 1966.		

NO.	ELEVATION	STATION	OFF-SET
1&1A	597.9	401+69	19' LT
2&2A	598.0	398+31	18' RT
3&3A	601.7	400+11	18' RT
4&4A	601.9	399+92	21' LT

NOTE
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS - ONTARIO			
MATERIALS & TESTING DIVISION - FOUNDATION SECTION			
CANADIAN PACIFIC RAILWAY			
KING'S HIGHWAY NO.	2	DIST. NO.	1
CO.	KENT		
TWP.	CHATHAM	LOT	6 CON. 1
BORE HOLE LOCATIONS & SOIL STRATA			
SUBM'D. R.M.	CHECKED	W.P. NO. 12-63	M.B.T. DRAWING NO.
DRAWN J.N.	CHECKED	JOB NO. 66-F-52	66-F-52 A
DATE	JUNE, 1966	SITE NO.	BRIDGE DRAWING NO.
APPROVED	<i>[Signature]</i>	CONT. NO.	

REF. NO. E-4370-1

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

W.P. 12-63.

To: Mr. B. R. Davis,
Bridge Engineer,
Bridge Division.
Attention: Mr. S. McCombie

FROM: Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

DATE: July 14, 1966

OUR FILE REF.

IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
Proposed C.P.R. Overhead at Hwy. #2,
2 Miles East of Hwy. #40, in Chatham,
District #1 (Chatham)

W.J. 66-F-52 -- W.P. 12-63

Attached, we are forwarding to you, our detailed foundation investigation report on the subsoil conditions existing at the above structure site.

We believe that you will find the factual data and recommendations contained therein, adequate for your design requirements.

Should additional information be required, please feel free to contact our Office.

AGS/MdeF
Attach.

A. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
A. P. Watt
A. Gater
F. C. Brown
J. Roy
A. Watt
Foundations Office
Gen. Files ✓

TABLE OF CONTENTS

1. INTRODUCTION.
 2. DESCRIPTION OF SITE.
 3. FIELD AND LABORATORY WORK.
 4. SUBSOIL CONDITIONS:
 - 4.1) General.
 - 4.2) Fill.
 - 4.3) Clayey Silt to Silty Clay.
 - 4.4) Silty Sand and Sandy Silt.
 5. GROUNDWATER.
 6. DISCUSSION AND RECOMMENDATIONS:
 - 6.1) Approach Fills.
 - 6.2) Structure Foundations
 7. SUMMARY.
 8. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION REPORT
For
Proposed C.P.R. Overhead at Hwy. #2,
2 Miles East of Hwy. #40, in Chatham,
District #1 (Chatham).
W.J. 66-F-52 -- W.P. 12-63

1. INTRODUCTION:

The Foundation Section was requested to carry out a foundation investigation at the above site. The request was contained in a memo dated April 18, 1966, from the Bridge Location Section (Mr. A. P. Watt, Bridge Location Engineer). An investigation was subsequently carried out by this Section to determine the subsoil conditions at the site. This report contains the results of this investigation, together with our recommendations.

2. DESCRIPTION OF SITE:

The crossing of the C.P.R. and Hwy. 2 is located approximately 0.5 miles East of the eastern city limit of Chatham. The area is quite flat and agriculturally developed. There is also some residential development, mainly along the highway. At present there is no grade separation between the highway and the tracks.

The surrounding area is noted for its rich soil derived from the underlying clay. Physiographically, the clay deposit is part of the "St. Clair Clay Plain," which is a glacial deposit consisting of a clayey till underlain at a considerable depth by Paleozoic bedrock. The relatively soft nature of the Paleozoic sediments which are believed to be the parent material of the till, may be explained by the general lack of gravel size particles in the otherwise till-like deposits.

cont'd. /2 ...

3. FIELD AND LABORATORY WORK:

Using conventional diamond drilling equipment adapted for soil sampling purposes, eight sampled boreholes and four dynamic cone penetration tests were carried out at the site. A driving energy of 350 ft.-lbs. per blow, was used for the dynamic cone penetration tests.

In cohesive materials, 2-inch I.D. Shelby tube samples were obtained by manually pushing the tubes into the soil if possible. Otherwise, samples of cohesive and non-cohesive materials were obtained using a 2-in. O.D. split-spoon sampler driven according to the specifications of the Standard Penetration Test. In addition, in-situ vane tests were conducted in the field to determine the shear strength of the cohesive materials wherever possible.

Samples were visually examined and identified in the field and subsequently in the laboratory. Laboratory tests were conducted on selected representative samples to determine:

- 1) Atterberg Limits.
- 2) Natural moisture contents.
- 3) Grain-size distributions.
- 4) Undrained shear strengths.
- 5) Bulk densities.

The results of the above tests, the field test results, and locations and elevations of the boreholes, have been summarized and are presented in Appendix I of this report.

4. SUBSOIL CONDITIONS:

4.1) General:

Subsoil at the site consists of a layer of surface fill, followed by a stratum of clayey silt to silty clay and by a deposit of silty sand to sandy silt.

cont'd. /3 ...

4. SUBSOIL CONDITIONS: (cont'd.) ...

4.2) Fill:

A surface fill deposit covers the immediate area of the highway-railway crossing. The thickness of the fill varies from 8 ft. in borehole 1 to 12.5 ft. in boreholes 3 and 4. The material is essentially granular in nature, consisting mainly of silty sand with occasional gravel. In places, the fill also consists of cohesive layers of clayey silt with sand.

'N' values in the fill material varied from 10 blows/ft. to 37 blows/ft., from which a relative density of compact to dense may be estimated.

4.3) Clayey Silt to Silty Clay:

This stratum was encountered in all boreholes, immediately below the fill deposit. Thickness of the deposit varied from 33 ft. in borehole 1 to 36 ft. in borehole 2. The deposit is essentially clayey silt (CL) containing occasional pockets of silty clay (CI).

Atterberg limits for clayey silt, as determined in the laboratory were as follows:

Liquid limit	($W_L\%$)	--	21% - 34%
Plastic limit	($W_P\%$)	--	15% - 21%
Moisture content	($W\%$)	--	14% - 38%

Grain-size distribution tests of samples from the overall deposit, gave the following average results: sand 2%, silt 77%, and clay 21%.

Field and laboratory shear strength test results gave the following values:

Field vane test	800 p.s.f.	-	>2000 p.s.f.
Undrained shear strength	400 p.s.f.	-	1520 p.s.f.
Standard Penetration test	3 blows/ft.	-	20 blows/ft.

cont'd. /4 ...

4. SUBSOIL CONDITIONS: (cont'd.) ...

4.3) Clayey Silt to Silty Clay: (cont'd.) ...

It was found that the shear strength was generally high in the upper portions, having a maximum of 1500 p.s.f. to more than 2000 p.s.f. From there, the shear strength generally decreases with depth, with a minimum of about 400 p.s.f. at approximate elevation 575. Below this elevation, the shear strength generally increases with depth, reaching a maximum of more than 2000 p.s.f. near the lower boundary of the stratum at approximate elevation 555.

The shear strength test results have been summarized and are shown on a graph "Shear Strength vs. Depth" which also contains the assumed design shear strength curves for the west and east approaches.

4.4) Silty Sand to Sandy Silt:

Underlying the stratum of clayey silt to silty clay, a deposit of silty sand to sandy silt was encountered in all boreholes. This deposit was proved to a depth of 13.5 ft. in borehole 4 and 21 ft. in borehole 2. Standard Penetration test (N) results in the stratum generally increased with depth and ranged from 68 blows/ft. to 100 blows/1 in., indicating a relative density of very dense.

5. GROUNDWATER:

Water level measurements in the boreholes were carried out during the time of investigation. These indicate that the groundwater level is at approximate elevation 593.

The exact groundwater levels are shown on the borehole logs as well as on Dwg. 66-F-52A, both attached to this report.

cont'd. /5 ...

6. DISCUSSION AND RECOMMENDATIONS:

An overhead structure is proposed for the crossing of Hwy. 2 and the C.P.R., 0.5 miles east of the east limits of Chatham. Subsoil at the site consists of 8 ft. to 12 ft. of soft to very stiff clayey silt to silty clay and very dense silty sand to sandy silt.

6.1) Approach Fills:

The maximum height of the proposed approach fills will be in the order of 30 ft. above the existing ground surface. Because of the presence of soft clay between elevations 580 and 570, certain measures are required to ensure the overall stability of the proposed approach fills.

Stability analyses in terms of total stresses, have been carried out by the use of the electronic computer using the following soil properties:

Fill Material:

Granular type -

$$\phi = 30^{\circ}$$

$$\gamma = 125 \text{ p.c.f.}$$

Tension crack - 8 ft.

Side slopes - 2:1

Width of embankment - 44 ft.

Subsoil:

- i) Existing granular fill material (elev. 600 - elev. 590)

$$\phi = 30^{\circ}$$

$$\gamma = 125 \text{ p.c.f.}$$

- ii) Clayey silt -

$$\gamma = 120 \text{ p.c.f.}$$

elev. 590 - elev. 585 - C = 1000 p.s.f.

elev. 585 - elev. 570 - C = 500 p.s.f.

elev. 570 - elev. 555 - C = 1000 p.s.f.

Groundwater at elev. 593.

cont'd. /6 ...

6. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

6.1) Approach Fills: (cont'd.) ...

Based on the stability analyses, it was concluded that using standard 2:1 side slopes, the fills will only be stable to a maximum height of 18 ft. above ground surface. For fills in excess of 18 ft. in height, berms are required in all directions to ensure overall stability. A graph showing the relationship between fill height and the length of berm required, is appended to this report.

In view of the presence of compressible subsoil, fill settlements can be anticipated. Consideration should, therefore, be given for the use of a flexible type of pavement.

6.2) Structure Foundations:

In view of the presence of clayey silt stratum at a relatively shallow depth from ground surface, spread footing type of foundation may not be practical at this location. Therefore, it is recommended that the entire structure be supported on end-bearing piles driven to practical refusal in the underlying very dense silty sand to sandy silt stratum. Pile driving during construction, should be controlled by the use of the Hiley formula (D.H.O. Standards DD-1218 and DD-1219). For estimating purposes, it can be assumed that the piles may reach practical refusal some 7 ft. into the sand stratum. Design loads on the piles will be dependent on the pile section selected. For example, a design load of 90 tons/pile may be used in the case of 12 BP 74 steel H-piles.

Since berms are required in the longitudinal direction for the proposed approach fills, the new structure should be of adequate length to accommodate such berms, or a multi-span structure could be considered.

cont'd. /7 ...

7. SUMMARY:

It is proposed to construct an overhead structure at the crossing of Highway 2 and the C.P.R. near Chatham. Subsoil consists of successive deposits of granular fill, clayey silt and silty sand to sandy silt.

It is recommended that the structure be supported on piles driven to practical refusal in the sand stratum. If 12 BF 74 steel H-piles are used, a safe load of 90 tons/pile may be used for design purposes. Pile driving in the field should be controlled by the use of the Hiley formula.

Berms are required for fills in excess of 18 ft. in height. A graph showing the relationship of berm lengths and fill heights, is shown on Dwg. 66-F-52D.

The proposed structure may have to be lengthened to accommodate the required berms in the longitudinal direction.

8. MISCELLANEOUS:

The field work, performed during June 1966, together with the preparation of this report, was undertaken by Mr. R. Magi, Project Foundation Engineer. The investigation was carried out under the general supervision of Mr. M. Devata, Supervising Foundation Engineer, who also reviewed this report.

Equipment was owned and operated by Canadian Longyear Ltd. of Toronto.

July 1966

APPENDIX I

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS:-

<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_s	UNIT WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
S_r	DEGREE OF SATURATION
w_L	LIQUID LIMIT
w_p	PLASTIC LIMIT
I_p	PLASTICITY INDEX
s	SHRINKAGE LIMIT
I_L	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$
I_c	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$
e_{max}	VOID RATIO IN LOOSEST STATE
e_{min}	VOID RATIO IN DENSEST STATE
I_D	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY D_r IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
m_v	COEFFICIENT OF VOLUME CHANGE = $\frac{-\Delta e}{(1+e)\Delta\sigma}$
c_v	COEFFICIENT OF CONSOLIDATION
C_c	COMPRESSION INDEX = $\frac{\Delta e}{\Delta \log_{10} \sigma}$
T_v	TIME FACTOR = $\frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

π	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ϵ	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL

DEPARTMENT OF HIGHWAYS - ONTARIO

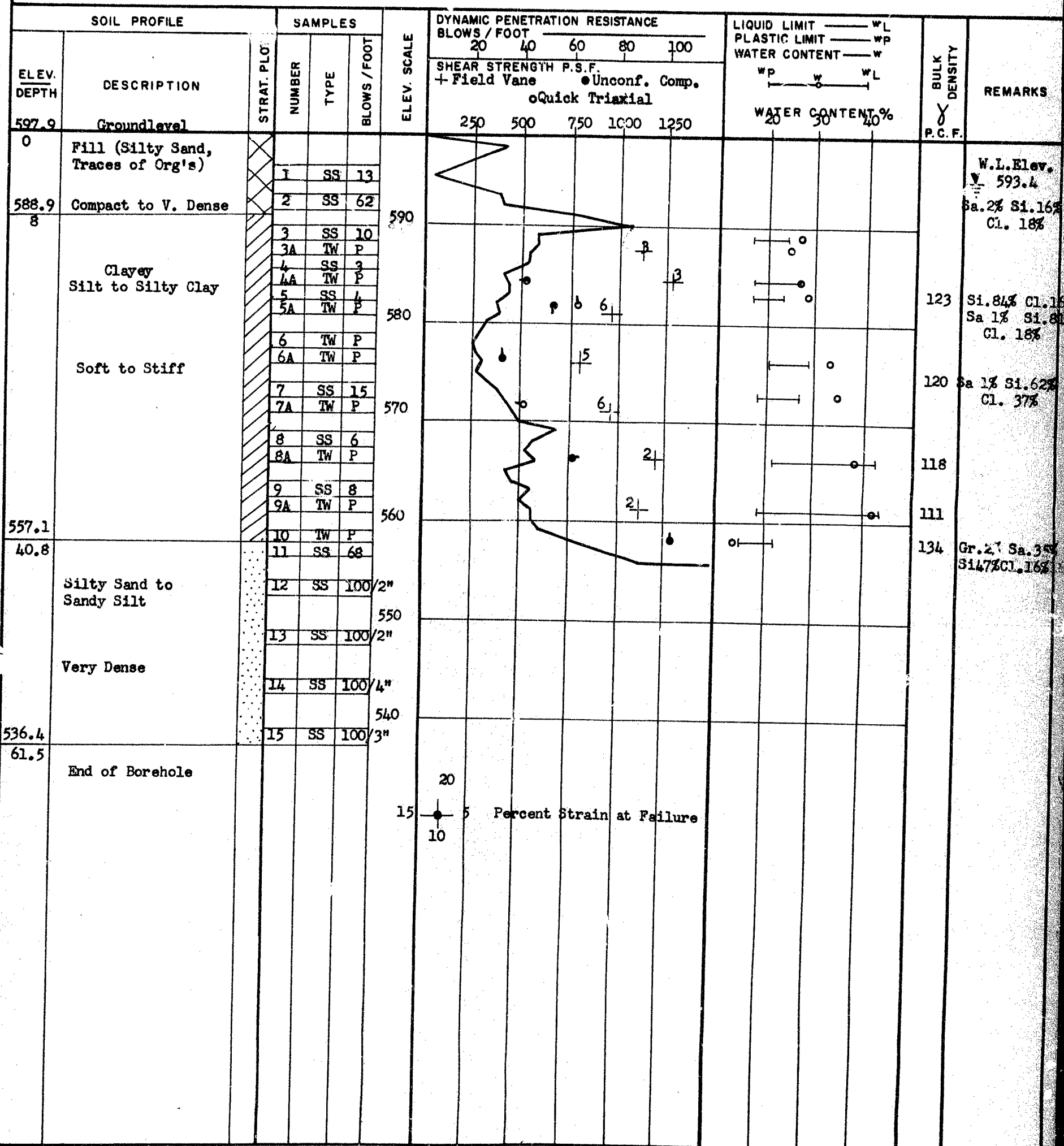
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 1 & 1A

FOUNDATION SECTION

JOB 66-F-52LOCATION Sta. 401/69 19' Lt.ORIGINATED BY R.M.W.P. 12-63BORING DATE May 30, 1966COMPILED BY R.M.DATUM GeodeticBOREHOLE TYPE Penn Auger and Cone Penetration

CHECKED BY _____



DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 2 & 2A

FOUNDATION SECTION

JOB 66-F-52 LOCATION Sta. 398+31 18' Rt. ORIGINATED BY R.M.
W.P. 12-63 BORING DATE May 31, 1966 COMPILED BY R.M.
DATUM Geodetic BOREHOLE TYPE Penn Auger and Cone Penetration CHECKED BY _____

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		20	40	60	80	100	20	30	40		
598.0	Groundlevel															
0	Fill (Silty Sand, Clayey Silt, Traces of Org's.)		1	SS	15										W.L. Elev. 593.0	
588.5	Compact		2	SS	12	590										
9.5	Clayey Silt to Silty Clay		3	SS	11										Sa. 2% Si. 83% Cl. 15%	
			4	SS	4											
			4A	TW	P											
			5	SS	4	580									121 Sa. 2% Si. 76% Cl. 22%	
			5A	TW	P											
	Soft to Very Stiff		6	SS	4										121	
			6A	TW	P											
			7	SS	5	570										
			7A	TW	P											
			8	TW	P											
			8A	SS	6											
			9	TW	P	560									118	
			9A	SS	5											
			10	SS	8											
			10A	SS	5											
552.5			11	SS	19 1/4	550										
45.5	Silty Sand to Sandy Silt		12	SS	100/5"										Sa. 4% Si. 84% Cl. 10%	
	Very Dense		13	SS	100/2"	540										
			14	SS	100/2"											
531.5						530										
66.5	End of Borehole															

20
15
10

5 Percent Strain at Failure

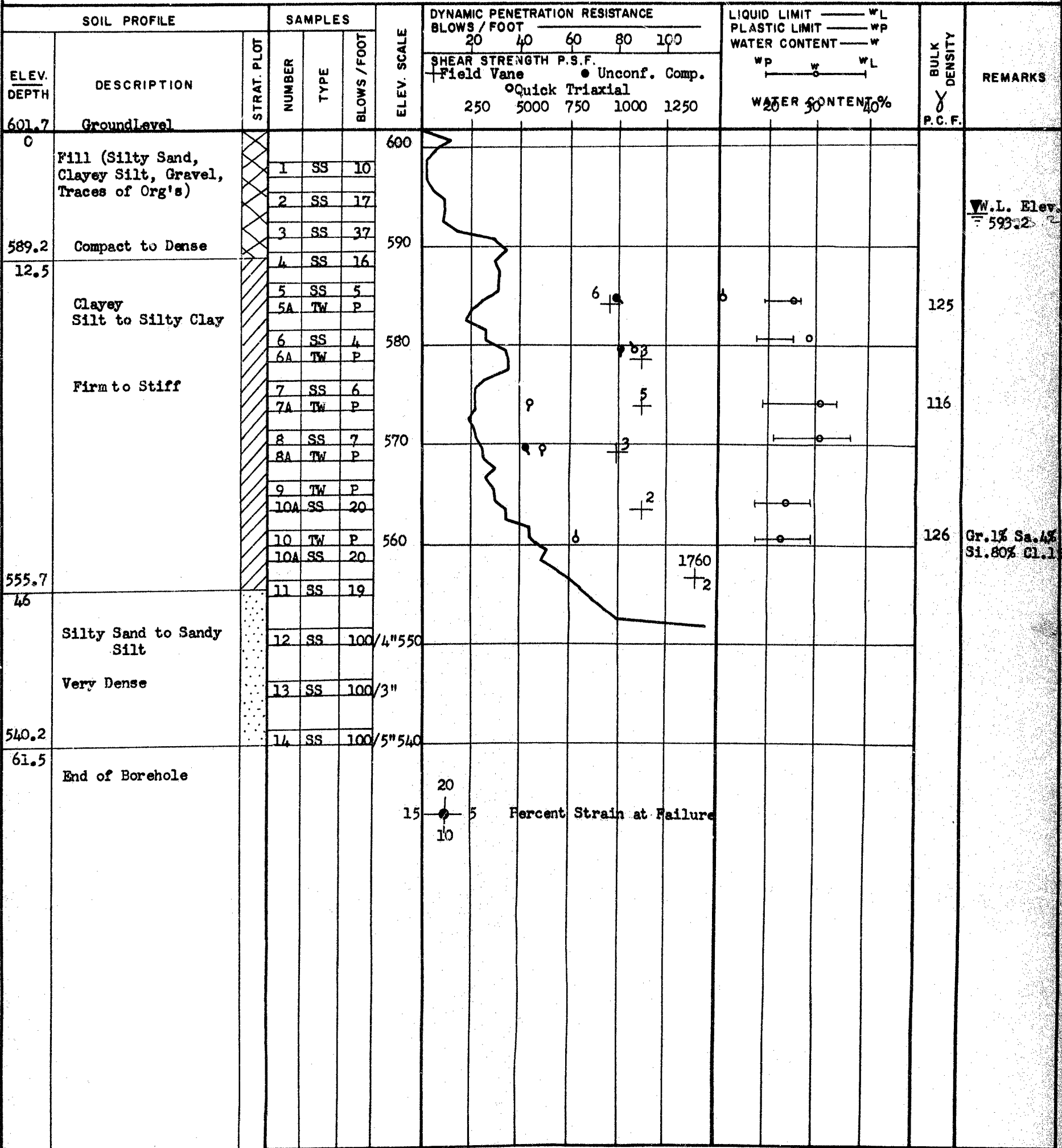
DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 3 & 3A

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 66-F-52 LOCATION Sta. 400/11 18' Rt. ORIGINATED BY R.M.
W.P. 12-63 BORING DATE May 31, 1966 COMPILED BY R.M.
DATUM Geodetic BOREHOLE TYPE Penn Auger and Cone Penetration CHECKED BY _____



W.L. Elev.
= 593.2

Gr. 1% Sa. 4%
Sl. 80% Cl. 1.1%

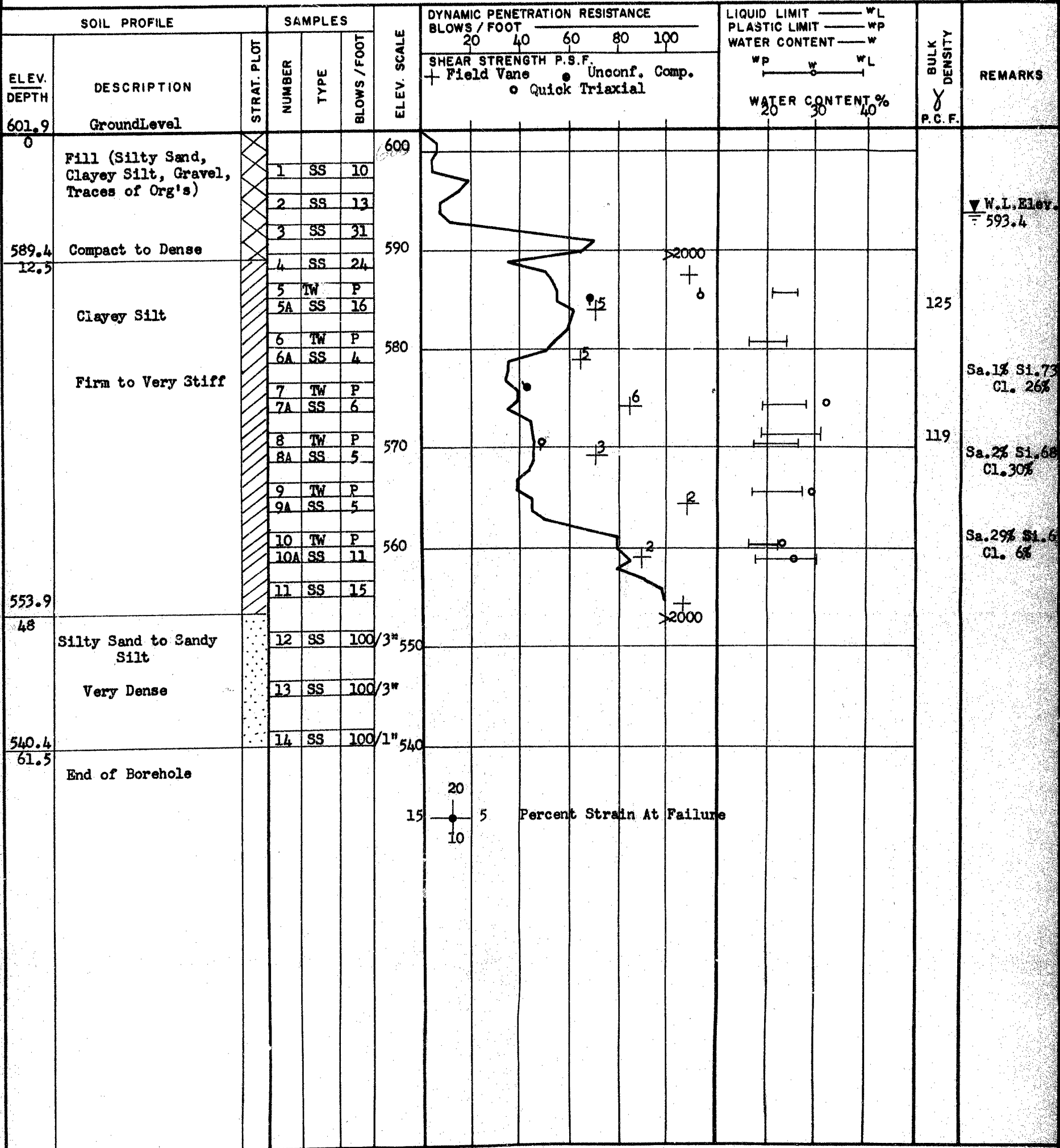
DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 4 & 4A

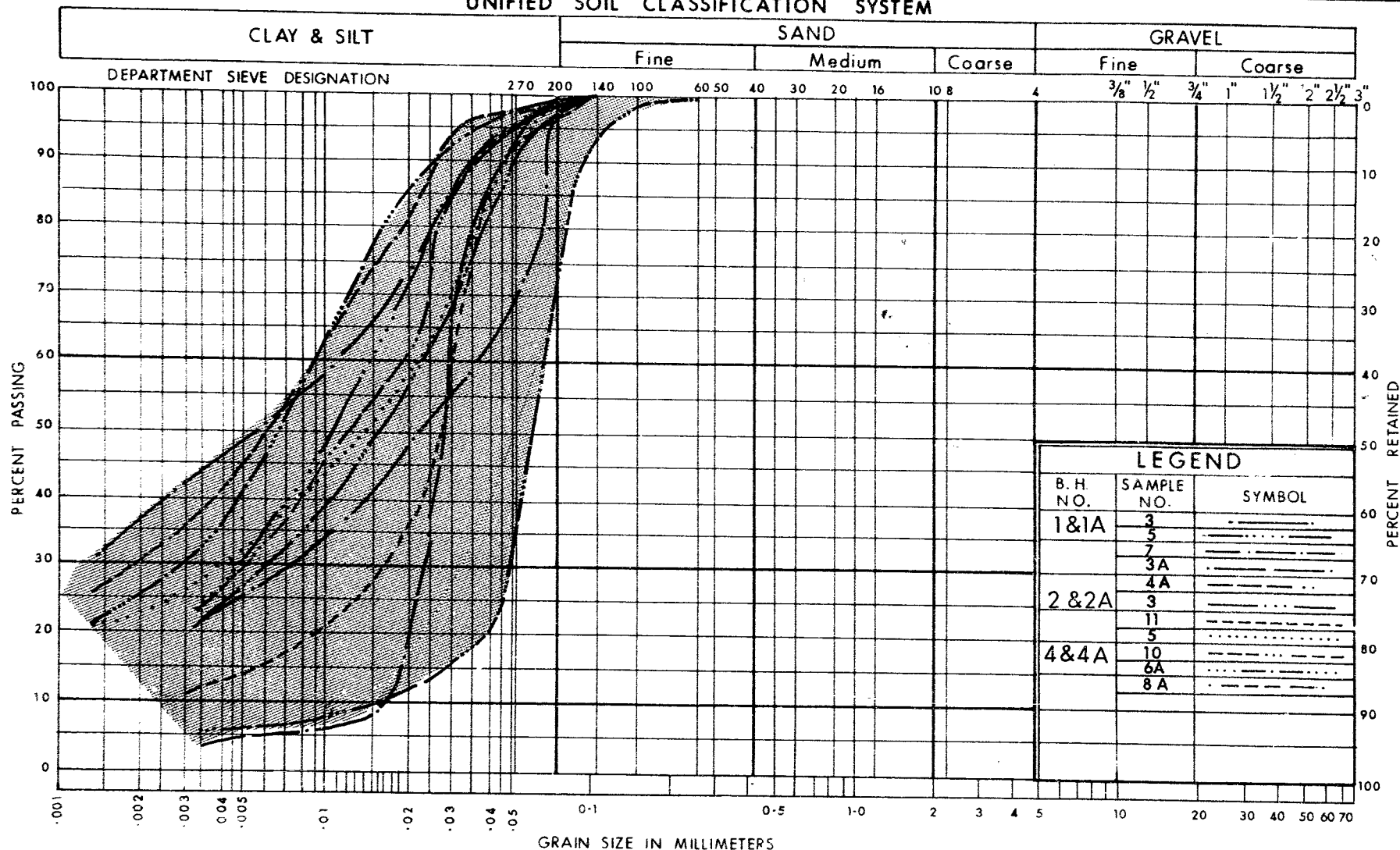
FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 66-F-52 LOCATION Sta. 399+92 21' Lt. ORIGINATED BY R.M.
W.P. 12-63 BORING DATE June 2, 1966 COMPILED BY R.M.
DATUM Geodetic BOREHOLE TYPE Penn Auger and Cone Penetration CHECKED BY _____



UNIFIED SOIL CLASSIFICATION SYSTEM



ONTARIO

DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION

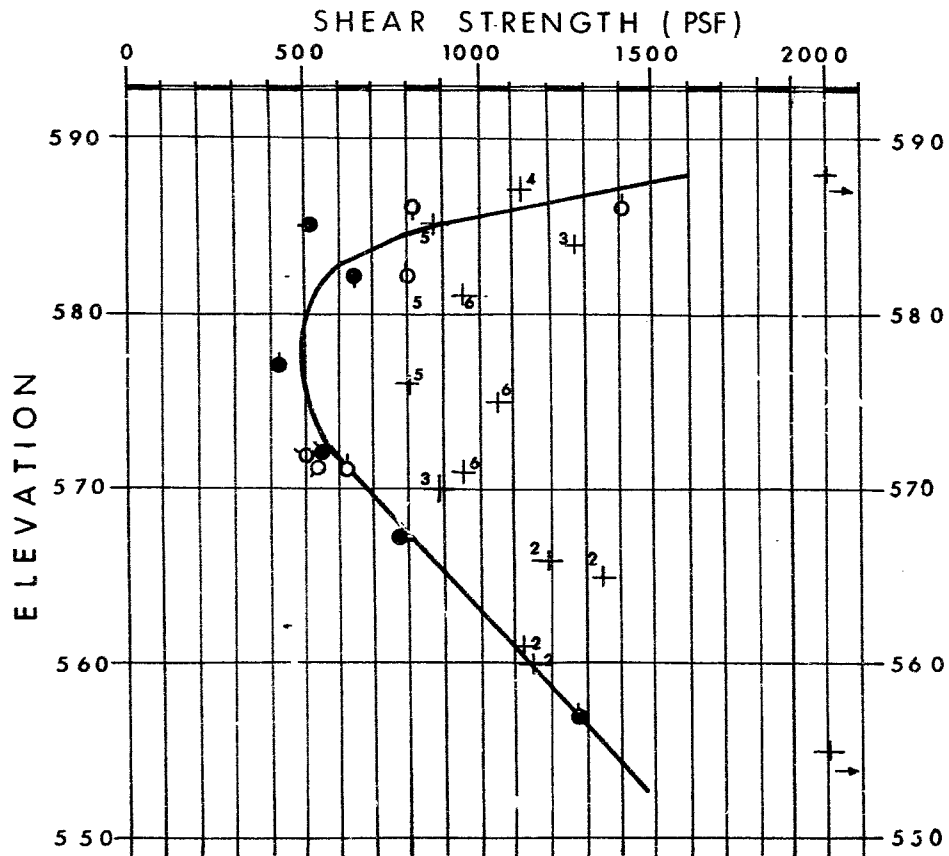
CLAYEY SILT TO SILTY CLAY

W.P. No. 12 - 63

JOB No. 66-F - 52

SHEAR STRENGTH vs. DEPTH

WEST APPROACH



LEGEND

FIELD VANE TEST	+
UNCONF. COMP. TEST	o
QUICK TRIAXIAL TEST	o



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

SHEAR STRENGTH vs DEPTH

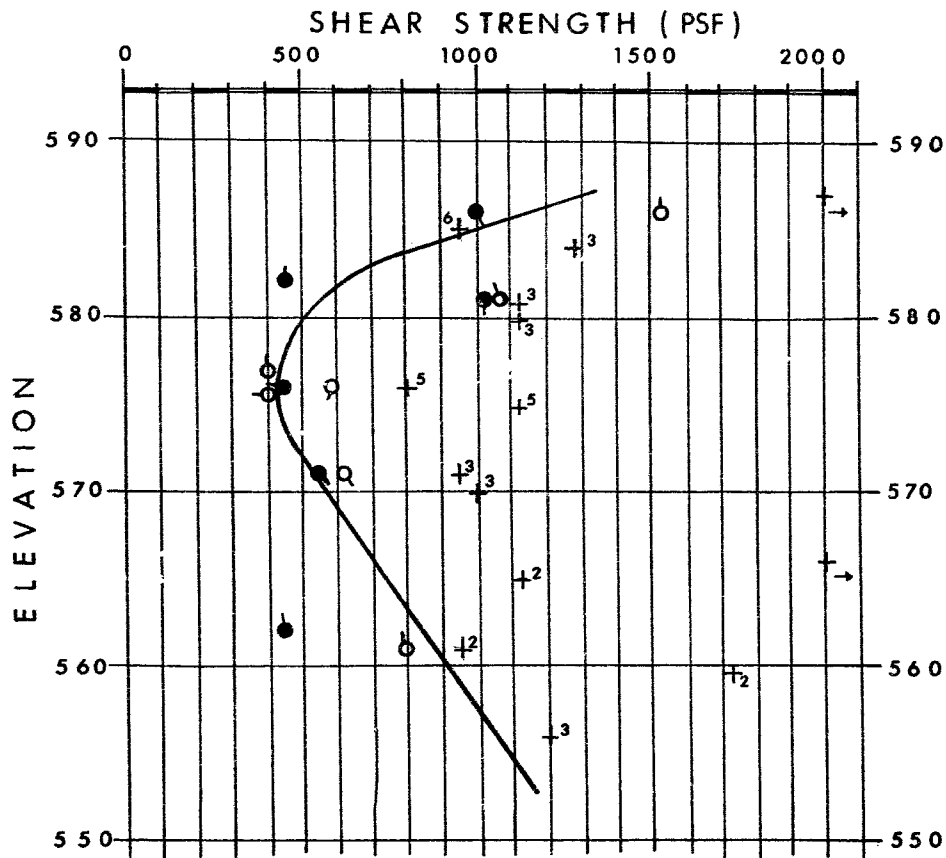
DATE 5 JULY 1966

APPROVED *Agstman*

DRAWING NO. 66-F-52B

SHEAR STRENGTH vs. DEPTH

EAST APPROACH



LEGEND

FIELD VANE TEST	+
UNCONF. COMP. TEST	•
QUICK TRIAXIAL TEST	o



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

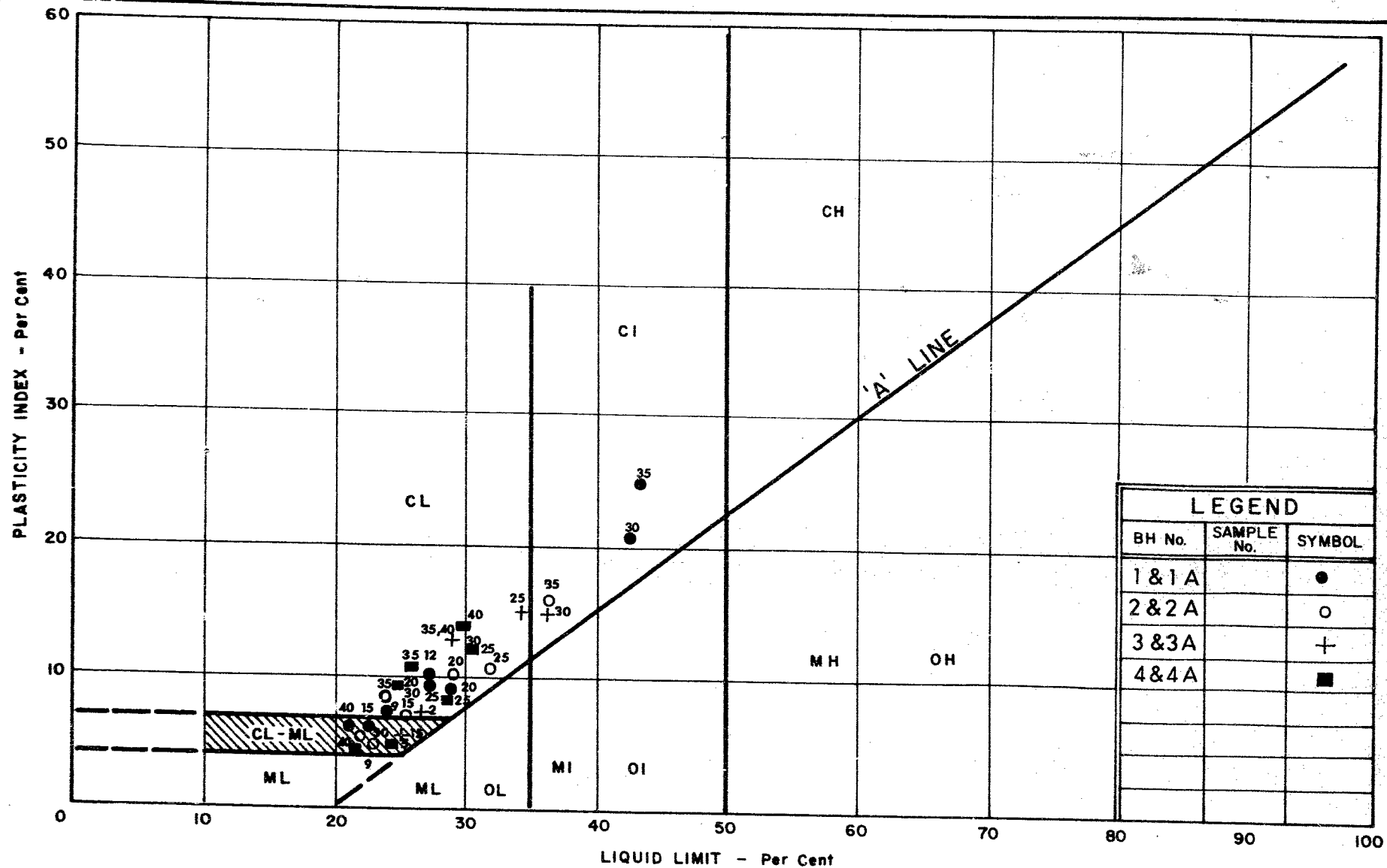
DATE 5 JULY 1966

APPROVED

A. S. Thomas

DRAWING NO. 66-F-52 C.

SHEAR STRENGTH vs. DEPTH

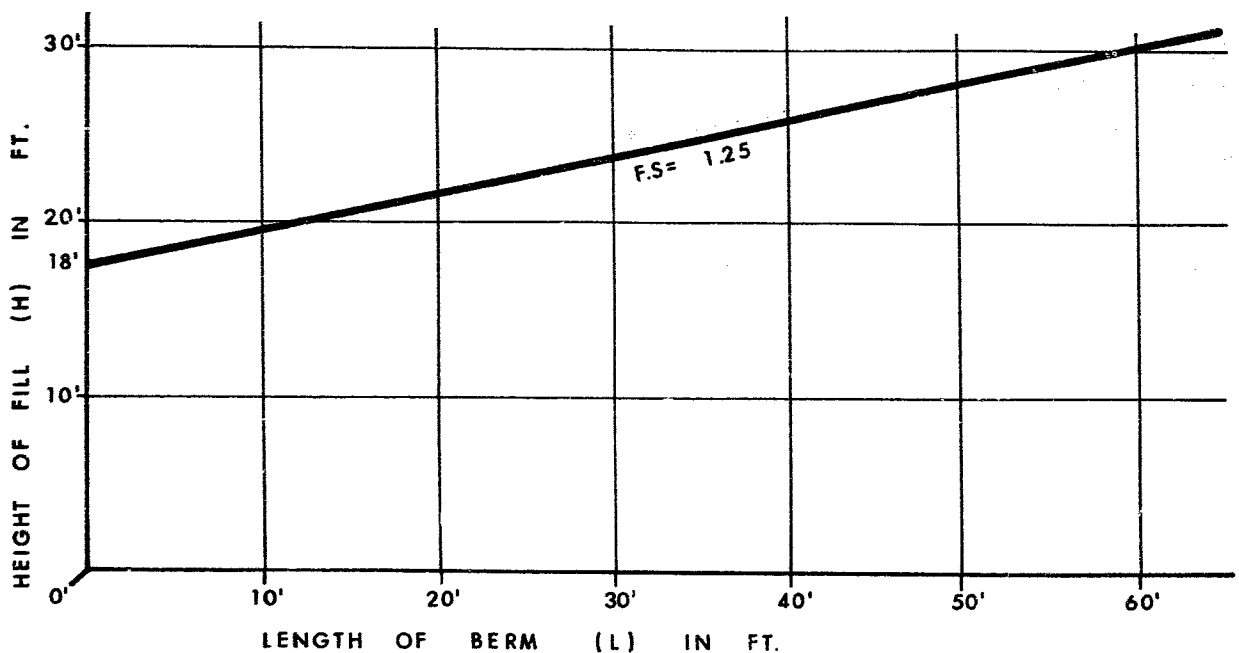
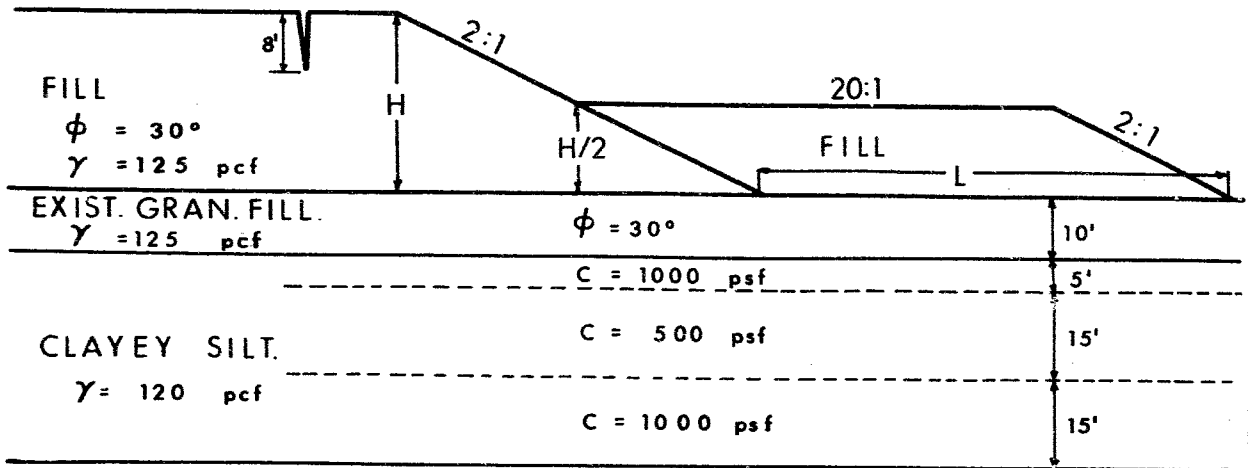


DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART CLAYEY SILT TO SILTY CLAY.

WP. No. 12 - 63
JOB No. 66 - F - 52

L = LENGTH OF BERM.
H = HEIGHT OF APPROACH FILL.
H/2 = HEIGHT OF BERM.



DEPARTMENT OF HIGHWAYS
**MATERIALS and
TESTING
DIVISION**

DATE 14. JULY , 1966

FILL STABILITY FOR THE CROSSING
OF HWY.2 & CPR. 0.5 MILES EAST OF
CHATHAM.

APPROVED

Alf H. Mac

W.P. NO. 12-63

DRAWING NO. 66-F-52 D

MEMORANDUM

To: Mr. A. Stermac,
Bridge Foundation Engineer,
Room 107, Lab. Building.

FROM: Bridge Division,
Downsview, Ontario.

DATE: April 18th, 1966.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. #12-63, Bridge Site #13-261,
C.P.R. Overhead,
2.0 miles east of Hwy. #40,
District #1.

Would you kindly arrange to have a foundation investigation conducted at the above location. I have enclosed two copies of the site plan number E-4370-1 with the probable footing locations marked in red. Would you also have additional borings made at the points indicated by a red circle in order to check the approach stability and the possibility of an abutment location.

I have also enclosed the G-plan number G-3061 along with the preliminary site report for your use. Accommodation can be found on Highway 2 very close to the site.

A. P. Watt

APW/cek
Encl.

cc. A. Crowley
R. Forrest

A. P. Watt,
Regional Bridge Location Engineer.

COMPLETION DATE

4" gas main 3' deep
2' south of north fence line

JULY 13/66

JULY 13/66

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

Be in touch with A. P. Watt
because the work 13/66 is
now over and could possibly
be done at the same time

MEMORANDUM

To: Mr. A. Sternag,
Bridge Foundation Engineer,
Room 107, Lab. Building.

From: Bridge Division,
Downsview, Ontario.

Date: April 18th, 1966.

Our File Ref.

IN REPLY TO

SUBJECT: W.P. #12-63, Bridge Site #13-261,
C.P.R. Overhead,
2.0 miles east of Hwy. #40,
District #1.

66-F-52

Would you kindly arrange to have a foundation investigation conducted at the above location. I have enclosed two copies of the site plan number E-4370-1 with the probable footing locations marked in red. Would you also have additional borings made at the points indicated by a red circle in order to check the approach stability and the possibility of an abutment location.

I have also enclosed the G-plan number G-3061 along with the preliminary site report for your use. Accommodation can be found on Highway 2 very close to the site.

A. P. Watt

APW/cew

Encl.

cc. A. Crowley
R. Forrest

A. P. Watt,
Regional Bridge Location Engineer.

COMPLETION DATE

4" gas main 3' deep

JULY 13/66

2' south of north fence line.

JULY 13/66

Enclosed are 4 copies of the site plan and preliminary site report for your use. The site plan shows the probable footing locations marked in red. The preliminary site report shows the approach stability and the possibility of an abutment location.

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

Mr. A. P. Watt,
Regional Bridge Location Engr.,
London Regional Office.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

October 17, 1966

W.P. 12-63 - Bridge Site 13-261
-- C.P.R. Overhead --
2.0 Miles East of Hwy. 40, Hwy. 2
District No. 1 (Chatham)

Further to your memo of September 27, 1966, we have carried out two additional borings, one at each of the two alternate locations for the proposed structure shown on your study plan No. F-3289. One borehole is located 1,000 ft. along the C.P.R. tracks, south of the existing Hwy. 2, and the other is 1,800 feet along the C.P.R. tracks north of the existing Hwy. 2.

The subsoil conditions found in these boreholes are very similar to those reported in the previous foundation investigation. Therefore, it would appear that no advantage can be gained from the foundation point of view, by relocating the structure in either of these two locations. It should be noted that these conclusions are based upon the results of one boring at each new location and, therefore, the subsoil conditions at either of the alternate locations may be slightly worse or better than indicated here.

The record of borehole logs for these two borings are being kept in this office for reference purposes.

Should you require additional information pertaining to this project, please feel free to contact this office.

MD/MdeP

cc: Mr. J. Roy

Foundations Office
Gen. Files

M. Devata

M. Devata,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

MEMORANDUM

66-F-52

To: Mr. A. G. Stermac
Principal Foundation Engineer
Lab Building
D O W N S V I E W

From: A. P. Watt

Date: September 27, 1966

Attention: Mr. M. Devata

Our File Ref.

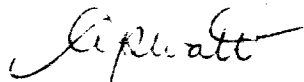
In Reply To:

SUBJECT: W.P. 12-63, Bridge Site 13-261,
C.P.R. Overhead,
2.0 miles east of Hwy. 40,
Highways 2,
District 1, Chatham.

Further to my foundation investigation request of April 18, 1966, would you kindly arrange to have further foundation investigations conducted in the vicinity of the above location.

Attached please find a study plan showing two alternate locations for the proposed structure, one shown in green 1000 feet along the C.P.R. tracks south of the existing Highway 2 and the other shown in red 1800 feet along the C.P.R. tracks north of the existing Highway 2. This investigation is to cover an area of 400 feet along the C.P.R. tracks centred on the two given intersections of the C.P.R. tracks and the proposed Highway 2.

As this project is falling behind according to the schedule of pre-engineering, would you kindly send us a letter stating that conditions in the new locations have improved and to what extent or that the conditions are the same as previously reported as soon as possible.



A. P. WATT
REGIONAL BRIDGE LOCATION ENGINEER

APW:gf

c.c. Mr. S. McCombie
Mr. R. G. Gascoyne